

XLIII.—*On the Occurrence of Loxomma Allmanni in the Northumberland Coal-field.* By ALBANY HANCOCK, F.L.S., and THOMAS ATTEY.

A FEW months ago we announced the occurrence in the Coal-shale near Newcastle of a considerable portion of the cranium of *Anthracosaurus*. We have now the pleasure of recording the presence of another large Labyrinthodont Amphibian in the same locality, Mr. Attley having recently obtained, in the black shale at Newsham, a nearly perfect skull of *Loxomma Allmanni*, Huxley, which we believe to be the first authenticated specimen of this fine Labyrinthodont that has been found in this neighbourhood.

The skull is complete, with the exception of the muzzle, which is entirely wanting; but in other respects it is in an excellent state of preservation. The exposed surface, which is that of the crown, is wholly covered with the honeycomb-like sculpture usual in these animals. The pits and ridges are remarkably regular and deep, though they are occasionally elongated; the ridges are smooth, and have a semigloss,—which two characters, taken together with the colour, a dark brown, give to the whole surface the appearance of carved box-wood.

As presented to view, the contour of the skull is triangular, with the apex truncated and the base or occipital region arched considerably inwards. The apex or muzzle not being present, it is impossible to say how much it was produced when perfect; but, judging from the gentle inclination of the side margins, it would seem to have been much prolonged. The whole of the muzzle is broken away as far backward as the anterior border of the enormous orbits. Across the broken extremity the skull measures about five inches; and the width of the occipital region at the widest part is nine inches; the length, from the broken anterior extremity to a line drawn between the points of the lateral expansions, is eight inches and a half. But if we make allowance for what is wanting of the muzzle, the length of the skull may be estimated as upwards of twelve inches.

The longitudinal centre of the cranium is composed of a comparatively narrow strip of bone, which is apparently made up of the frontals, the prefrontals, the parietals, the post-frontals, the epiotics, and the occipitals; but it is quite impossible to determine the boundaries of these component parts, as the sutures are invisible, notwithstanding the fine condition of the specimen. The anterior portion of this compound strip of bone divides the large oblique orbits, the posterior portion the

great lateral expansions which form the sides of the occipital region. In front it is a little expanded laterally, and measures two and a quarter inches across; thence backwards for two and three-quarter inches the sides arch gently inwards, forming the inner anterior boundaries of what may be termed the anterior division of the orbits; and then for an inch and three-quarters further back the sides are more strongly arched in the same direction, forming the inner posterior boundaries of the posterior division of the orbits, there being at the junction of the two divisions of the inner orbital boundary a strong angular projection, emphatically marking off the two parts. At this point the interorbital bone is two inches wide. A little further back, at the narrowest part, it is only an inch and three-eighths wide. The inner boundaries of the orbits appear to be formed by the pre- and post-frontals.

The posterior portion of this central strip reaches from the hinder margin of the orbits to the occiput, the sides being very slightly arched outwards, and continuous with the lateral expansions. This portion of the cranium is two inches and six-eighths wide, and two inches and three-eighths long, measuring from the posterior boundary of the orbit to the point of the epiotic bone, and, rising a little above the general surface, is strongly defined. The occipital margin is slightly arched inwards, and at either side is produced backwards into short horns—the posterior points of the epiotic bones. This division of the central strip of bone is composed of the occipitals, the parietals, a portion of the postfrontals, and the epiotics, though here, as in the anterior division, the boundaries cannot be determined with precision. No parietal foramen can be observed.

The lateral expansions are each three inches wide, and, according to Prof. Huxley, they are composed of the postorbitals, the malars or jugals, the squamosals, and the quadrates. They project backwards quite an inch and a half beyond the central portion of the skull. The hinder margin of each at first bends outwards and backwards from the side of the epiotic bone for about two-thirds of its extent; it then suddenly turns a little forwards and terminates in a short point at the lateral or external angle. From the base of this point the outer or lateral margin advances forwards and outwards, being at first, for about an inch, a little concave; it then bends a little inwards, and runs forwards in a straight line an inch and five-eighths further to the posterior extremity of the maxilla. From this point, which is only slightly indicated, the lateral walls of the skull are continued in a uniformly inclined line to

the anterior extremity. The inner part of the posterior margin is formed by a ridge which thickens and enlarges at the point where it turns suddenly forwards, and this thickened part is turned upwards and overlaps a little the upper surface of the skull; thence to the external point or horn the surface is smooth, and has the appearance of being that of a joint. This is apparently the tympanic bone.

The surface-sculpture, however, does not extend so far back as this; it terminates abruptly in a sigmoidal line that reaches from the outer margin of the epiotic bone about midway between its posterior horn and the hinder boundary of the orbit to the base of the outer cornu. At first this line (that is, its inner extremity) arches gracefully forwards, and then sweeps backwards and outwards to its outer termination, as already indicated. Behind this line the bone is depressed and smooth; the space next the epiotic bone is of considerable extent, and has all the appearance of being for muscular attachment: probably the temporal muscles may originate here; for muscles so placed would be conveniently situated to act upon the articular extremity of the mandible.

The posterior outer boundary of the orbit is formed by the postorbital, the limits of which can be partially traced; it is narrow, and extends from the postfrontal to the inner posterior border of the malar; its orbital margin is concave, and is inclined outwards and forwards. The limits of the malar are also pretty well defined; it is wide behind, before quite narrow, not being more than seven-eighths of an inch wide, including the thickness of the posterior extremity of the maxilla, which forms as it were a narrow border to its straight margin. When perfect, this narrow portion of the malar could not be less than two and a half inches long; more than two inches of it still remains, the anterior extremity having been broken away. The orbital boundary of this part is only very slightly concave; it then rather suddenly bends inwards and backwards as it approaches its junction with that of the postorbital, where there is a slight bulging inwards. From this point the posterior margin of the malar is bounded by the postorbital, the squamosal, and the quadrate. At first this boundary passes inwards and backwards, then outwards and backwards, and finally forwards and outwards, reaching the straight external margin of the malar at the posterior point of the maxilla. This enlarged posterior portion is upwards of an inch and a half wide.

The orbits are both imperfect in front, the anterior boundaries having been broken away; but the form, notwithstanding, is determinable throughout. They are very large, mea-

suring upwards of four inches long and one inch and a half wide at the projection of the interorbital bone. Behind this point, which divides it into two parts, an anterior and posterior, the orbit extends obliquely outwards and forwards; and in front of it the anterior division, which is the larger, turns a little inwards and forwards.

The maxillæ extend backwards to within three inches of the external cornua; as much as four and a quarter inches of the posterior portion is present: they are narrow and straight, and border the straight outer margin of the malar, forming the lateral boundaries of the cranium. In the right maxilla there are five teeth—four towards the anterior fractured extremity, and the fifth, of which the stump only remains, is seven-eighths of an inch from the hinder extremity. Three of the anterior ones are perfect: the first is placed a quarter of an inch from the broken end of the jaw, and is about half an inch from the next tooth; the second, third, and fourth are a quarter of an inch apart (the crown of the latter is gone); the fifth is placed an inch and three-quarters further back, the intermediate teeth having probably been removed. The remains of three or four teeth are observed in the left maxilla, placed about the same distance apart as those of the right maxilla.

These teeth are of equal size; the perfect ones measure three-tenths of an inch in length; they are grooved from the base halfway up the crown; the upper portion is compressed in the direction of the long axis of the jaw, and the sides are produced into wide, sharp cutting-margins; the extremities are abruptly pointed.

A large palatine tooth or tusk is seen a little within the fractured extremity of the right maxilla, sinking into the matrix; the exposed portion is three-quarters of an inch in length; it is half an inch wide at the base, and is three-eighths of an inch wide at the upper extremity; it is therefore probable that not half the tooth is seen, and that it cannot have been less than an inch and a half in length.

The under surface of the specimen is partially exposed; but too little is displayed, and that little is too much disturbed, to admit of clear elucidation. Part, however, of the basisphenoid and its lateral processes can be observed, as well as a portion of the palatal bones; also the palato-temporal foramen seems to be in part recognizable.

We have already stated that this fine cranium is the first authenticated evidence of the occurrence of *Loxomma* in the shale of the Northumberland coal-field. Mr. Atthey, however, has had in his cabinet for several years the crushed cranial bones of this Labyrinthodont; but, owing to the confusion of

the parts, we were quite unable to determine to which of the known forms to refer them, until the possession of the specimen under discussion cleared up the matter. We can now trace distinctly the presence of the central portion of the cranium, which agrees with that before us in form and surface-sculpture. A portion of a maxilla, with a few teeth attached, as well as considerable remains of the lateral expansions, are likewise determinable.

Having now the advantage afforded by the possession of this almost perfect skull of *Loxomma Allmanni*, we are also enabled confidently to refer to the two magnificent Labyrinthodont skulls exhibited and described, under the name of *Pteroplax brevicornis*, by Mr. James Thomson and Prof. Young, of Glasgow, at the meeting of the British Association held last year at Exeter. On passing through Newcastle on his road homewards, Mr. Thomson kindly gave us an opportunity of inspecting these specimens; and at the time we pronounced them to belong to *Loxomma*—certainly not to *Pteroplax*. We are now in a position to speak on the subject without the least hesitation, in confirmation of our opinion then expressed. That our cranium is that of *Loxomma*, there is not the least doubt; that it agrees with Mr. Thomson's specimens generically, and, we believe, specifically, is equally certain; and that *Pteroplax* is distinct from *Loxomma*, we have the high authority of Prof. Huxley, who has examined our type specimens of the former.

This is quite evident even on a cursory examination of the two forms. But we may take this opportunity to state that *Pteroplax* deviates considerably, in the structure of the cranium, from all known Labyrinthodonts. In the conformation of the head it approaches the Siren. This fact was entirely overlooked by us at the time of the publication of our paper on the subject (*Ann. Nat. Hist. ser. 4. vol. i. p. 266*), and was not recognized until Prof. Huxley kindly pointed it out to us some time afterwards.

Pteroplax has no posterior lateral expansions like those in *Anthracosaurus* and *Loxomma*, as we thought it would have (the whole, or nearly the whole, of the cranium is figured in plate xv. fig. 1 of the above paper); the maxillæ are also deficient. The long curved horns are undoubtedly the equivalents of the lateral external cornua in *Loxomma*; and the overlying points are the homologues of the inner horns, being in both genera the posterior extremities of epiotic bones.

Shortly before the occurrence of the cranium of *Loxomma* at Newsham, Mr. Atthey obtained from the same locality a series of vertebrae, lying nearly in natural order, with a few

ribs scattered among them. We think these also probably belong to *Loxomma*. There are fourteen or fifteen vertebrae; but, unfortunately, little can be made out respecting them except the form and character of the bodies, the processes of which are not determinable, though they seem mixed up with the matrix, which is partly composed of iron-pyrites.

The largest vertebrae are about seven-eighths of an inch wide, and five-eighths of an inch long; they are slightly hollowed at the ends, with the margins a little reflected; there is a minute notochordal foramen in the centre; but this is not always visible; and the sides are hollowed or channelled, but do not exhibit much striation.

The ribs are peculiar in form; they are about five inches long, but we cannot be certain that they are entire; the shaft is three-eighths of an inch wide, and is not much compressed; nor do they exhibit the longitudinal groove so usual in the ribs of these Amphibians. The proximal extremity is exceedingly wide, measuring across seven-eighths of an inch; it is much compressed; but the capitular margin is thick and continues the curve of the shaft; it projects a little beyond the tuberculum, and is divided from it by a very shallow notch; the bifurcation is consequently exceedingly shallow. The tubercular process turns suddenly from the shaft, and, though thin, widens out into a large concave articular surface, much larger than that of the capitulum.

There is, of course, no certainty that these vertebrae and ribs are really those of *Loxomma*; but, from their occurring in the same locality and about the same time as the cranium, we may infer that it and they came from the same part of the seam; hence the probability that they belonged to the same animal; and, moreover, the ribs differ considerably from those of *Anthracosaurus* and *Pteroplar*, the only other large Labyrinthodonts that have yet been found in the Newcastle coal-field.

MISCELLANEOUS.

The Male Prothallium of the Vascular Cryptogamia.

By A. MILLARDET.

OUR knowledge of the true nature of the functions of reproduction in plants is much less advanced than that of the functions of nutrition. Every work upon the former subjects therefore possesses great interest, especially if the author, as in the present case, rises to general considerations, and does not confine himself to the more or less minute description of certain organs. From this point of view the title of M. Millardet's memoir is too modest. After de-